Valley City State University

Science Unit Plan Part A

Modified TLC

Science Methods

General Information	
UNIT AUTHOR	
First and Last Name	Josiah Cole
Email contact	josiah.cole@ndus.edu
UNIT OVERVIEW	
Unit Title	What can fossils tell us about the past?
Content Area	Science
Grade Level	Grade 3

TLC Requirements
PLAN—Planning Instruction and Assessment
Purpose: Describe your plans for the learning segment and explain how they are appropriate for the students and content you are teaching. Demonstrate your ability to select, adapt, design, and organize curriculum, instruction, and assessment to help diverse students learn and meet the standards the for curriculum content as well as develop academic language related to that content. (InTASC #7 Planning for Instruction)
A. Unit Foundation
1. Unit Summary
In this unit, students will have the opportunity to interact with fossils and use them to learn about the past. Along with engaging with these primary sources, students will build additional background knowledge through carefully selected books and websites that are related to this area. Instruction will be given as a whole group and students will be placed into small groups to work collaboratively and support each other's learning. While students are interacting with the resources provided to support their learning, the teacher will be assessing for understanding of the content using formal and informal assessment. Changes to instruction and assessment will be evaluated during this assessment of the students. The goal of this unit is for students to strengthen their scientific reasoning ability and to find evidence that supports their reasoning. During this unit, the class will be visiting a museum where they will be learning more about the adaptations animals had that helped in their survival. Students will be assessed on their ability to use evidence to support their reasoning at the end of the unit. At the end of the unit, students will be locating one adaptation, that is present in the fossil(s), an animal had that gave it an advantage in its environment
2. Standards to be met (List and write out. Identify source: NGSS, state standards, CCSS, etc.)

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Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - **3-LS2-1:** Construct an argument that some animals form groups that help members survive.
  - **3-LS4-1:** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Standards

- *Grade 3: Ecosystems: Interactions, Energy, Dynamics*
  - **3-LS2-1:** Construct an argument that some animals form groups that help members survive
- *Grade 3: Biological Evolution: Unity & Diversity*
  - **3-LS4-1:** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago
  - **3-LS4-2:** Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

3. Objectives/Learning outcomes (based on above standards)

The students will:

- Locate adaptations for survival using fossil evidence.
- Use fossils to describe an animal's behavior and appearance.
- Describe the environment an animal lived in using fossils as supportive evidence.
- Use modern day animals to support reasoning that forming groups aids in survival.
- Relate modern animal behavior to interpretations of a fossilized animal's behavior.
- Find evidence in fossils that past animals lived in groups.
- Summarize how an adaptation found in a fossil helped an animal survive.
- Research how paleontologists construct hypotheses of past animal behavior using fossils.

4. Academic Language to be emphasized (List and define in student-friendly terms, avoid capitalization unless term is a proper noun)

adaptation- a special skill which helps an animal to survive and do everything it needs to do.
cast- an object made in a mold.
diet- the kinds of food that a person, animal, or community habitually eats
exhibit- publicly display (a work of art or item of interest) in an art gallery or museum or at a trade fair
extinct- a group of animals with no more living members.
extinction- the process of a group of animals becoming extinct.
fossil- the remains of plants and animals that lived long ago.

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fossilize- to become a fossil or cause something to become a fossil.
habitat- the natural home or environment of an animal, plant, or other organism.
herd- a large group of animals living together
mold- a hollow container used to give shape to a liquid material when it hardens.
organism- a living thing made up of one or more cells and able to carry on the activities of life.
museum- a building in which objects of historical, scientific, artistic, or cultural interest are stored and exhibited
paleontologist- a scientist who studies fossils.
prehistoric- relating to the period before written records; very old.
species- a group of similar individuals who are able to reproduce.
trace fossil- a fossil of a footprint, trail, burrow, or other trace of an animal rather than of the animal itself.

5. Unit questions

a. Essential "overarching" or "big idea" questions

How do fossils inform us about the animal's life and behavior?
What adaptations can be found in fossils that helped animals survive during their lifetime?

b. Questions for students (developed using Bloom's taxonomy, Kaplan's icons for depth and complexity, English Learner Oral Language Questioning Techniques, etc.) for all levels of thinking

Lesson #1

- Where do fossils come from?
- How are fossils formed over millions of years?
- How do paleontologists use fossils to predict the behavior of dinosaurs?
- How do paleontologists locate fossils?

Lesson #2

- How are modern day animals and dinosaurs alike and different?
- How do paleontologists predict how dinosaurs behaved?
- Why do some animals live in groups?
- What are the benefits of animals living in groups?
- How do adaptations aid animals in survival?
- What are some examples of adaptations that animals have?

Lesson #3

- Why do scientists use modern-day animals to study dinosaurs?
- What are some examples of adaptations that dinosaurs had that helped them survive?

- Why do scientists use 3-D imagery to create an image of the dinosaur?
- For what reasons did dinosaurs need adaptations?

Lesson #4

- Why are fossils displayed at museums?
- What information is important to show alongside a fossil at a museum?
- How do museums create their exhibits to be informational?
- Which dinosaurs have easily identifiable adaptations in their fossils?

Lesson #5

- How do paleontologists identify adaptations in a fossil?
- How did dinosaurs use their specific adaptation to survive?
- How do paleontologists determine the age of a fossil and dinosaur?
- What factors do paleontologists use to determine how the dinosaur lived?

C. Instructional Technology and Materials to be used in Unit

a. Technology to be used by the teacher (list hardware, software, websites, etc.)

Hardware/Software:

Classroom Computer
Projector
Interactive Smart Board

Websites:

[GenerationGenius]. (2018, October 7). *Animal group behavior: Fun science lesson for kids: 3rd, 4th, and 5th grade.* Retrieved from https://www.youtube.com/watch?v=7v-D9WmEBUQ

[GenerationGenius]. (2018, October 6). *Fossils & extinction: Fun science lessons for kids: 3rd, 4th, and 5th grade.* Retrieved from https://www.youtube.com/watch?v=bVYVnfs5NqI

[MrLalzor]. (2017, June 8). *Jurassic park: They move in herds 1080p*. Retrieved from https://www.youtu be.com/watch?v=eSS4YtDJOO0

PBSLearningMedia. (2019). *Studying adaptations for walking in dinosaurs*. Retrieved from https://www.pbslearningmedia.org/resource/nat16.sci.lisci.dinowalk/studying-adaptations-for-walking-in-dinosaurs/#.XdSkl1dKjtQ

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[SciShow Kids]. (2015, August 20). *Dig into paleontology*. Retrieved from https://www.youtube.com/watch?v=1FjyKmpmQzc

b. Technology to be used by the students (list hardware, software, websites, etc.)

Hardware/Software:

Laptops
Microsoft PowerPoint
Microsoft Word

Websites:

Science Museum of Minnesota. (2019). *Exhibits, films, and events*. Retrieved from https://www.smm.org/exhibits-films

c. Materials and supplies

Lesson #1	
Play-Doh	3 tubs per student
Toy Dinosaur	1 per student
Computer	
Projector	
Smart Board	
"Dinosaurs Before Dark"	

Lesson #2	
"Dinosaurs Before Dark"	
Computer	
Projector	
Smart Board	
Science Journal/Pencil	1 per student
White Paper	1 per student
Paper Plates	1 per student
Red Paint	1 tube
Blue Paint	1 tube
Yellow Paint	1 tube
Green Paint	1 tube
Toy Dinosaur	1 per student

Lesson #3	
"Dinosaurs Before Dark"	
Computer	
Projector	
Smart Board	
Pencil	1 per student
Adaptation Worksheet	1 per student
Laptop	1 per student
Construction Paper	2 per student

Lesson #4	**Lesson #5**

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Computer	"Dinosaurs Before Dark"	
Projector	Document Camera	
Smart Board	Projector	
Laptops	Smart Board	
Construction Paper	T-Rex Tooth	
Field Trip Permission Form	Stegosaurus Back Plate	
Scavenger Hunt Worksheet	Triceratops Skin	
	Velociraptor Claw	
	Ankylosaurus Armor Plate	
	Science Notebook/Pencil	1 per student
	"World Encyclopedia of Fossils and Fossil Collecting"	
	Construction Paper	1 per student

d. Other resources

Osborne, M. P. (1992). *Dinosaurs before dark*. New York: Random House

Osborne, W, & Osborne, M. P. (2000). *Dinosaurs: A nonfiction companion to Magic Treehouse #1: Dinosaurs before dark.* New York: Random House

Parker, Steve. (2007). *The world encyclopedia of fossils and fossil collecting*. London: Southwater.

D. Assessment Tools and Criteria

1. Explain your thought process for planning a post-assessment and a pre-assessment.

The easiest way for me to assess what students already know is for them to take a pre-test that will be taken twice during this unit. The students will take the test before the unit begins so I am able to see what the students already know about the topic. This assessment will also guide my instruction during the lesson and let me know which direction the lesson should take. I will administer this assessment to the students at the end of the unit, so I am easily able to compare the scores of the pre and post assessment and assess students' learning. After I have given the two assessments, I can use the results to inform which areas of the lesson need additional instruction.

During the instructional period of each of the lessons, I will use both formal and informal assessment to check for understanding for my students. I will primarily use anecdotal records to assess students' understanding of the content that is being taught. I believe that the best way of getting to know whether or not a student is comprehending the lesson is to observe them as they participate in the lesson. A test is not always the best indicator of a student's understanding because some students are not good test takers, they may be better suited in

showing their understanding in another way. I will also use a series of exit slips after select lessons to ensure each student is on track and understands the lesson. I will use the exit slips to check for understanding as well as guide instruction.

2. Provide samples of the assessments you will use.

a. Sample pre-assessments

Name: _____

WHAT CAN FOSSILS TELL US ABOUT THE PAST?

1. **What is a fossil?**
   a. the remains of animals that lived long ago
   b. a kind of dinosaur
   c. a tool used to dig
2. **A paleontologist is someone who...?**
   a. finds the cure to illnesses
   b. is a doctor for children
   c. studies fossils
3. **Why do paleontologists study fossils?**
   a. to learn about how the dinosaur lived
   b. to have something to do with their time
   c. to put the skeleton together
4. **Which of the following is an example of an adaptation?**
   a. a mouse having a small tail to fit in small places
   b. a giraffe having a long neck to eat the leaves at the top of trees
   c. a group of caribou living together to look out for predators
5. **Why do some animals live in large groups?**
   a. to protect themselves from predators
   b. to have a larger selection of mates
   c. both a & b
6. **What is the definition of an adaptation?**
   a. a skill that helps an animal survive
   b. the act of adding onto a house
   c. a trip that involves a family moving across the country
7. **How much do you know about fossils?**

Nothing at all A little I'm an expert!

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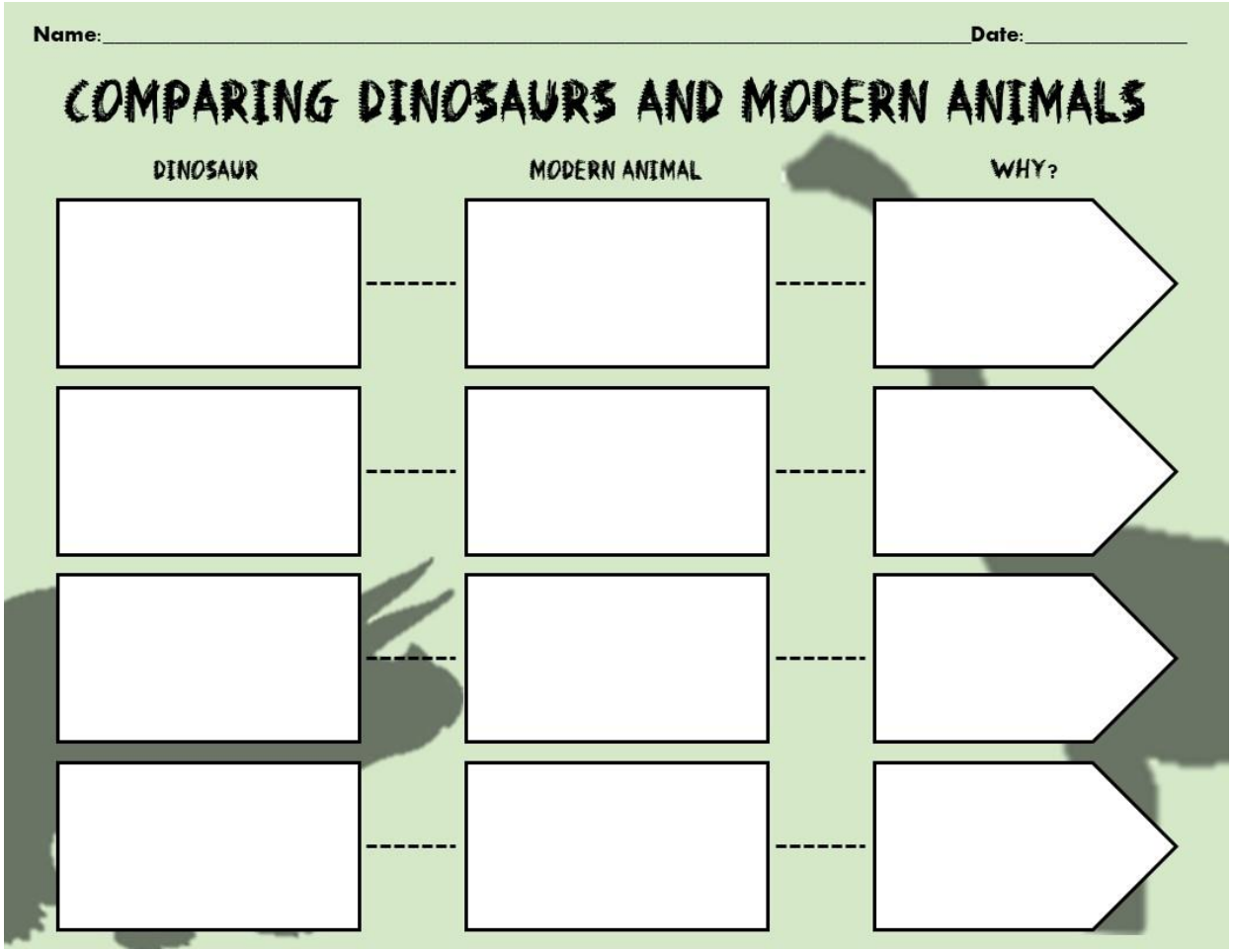
b. Sample formative assessments

Dinosaur/Animal Comparison from Lesson #3



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Scavenger Hunt Template from Lesson #4

Name:_____ **Date:**_____

DINOSAUR ADAPTATION SCAVENGER HUNT

Dinosaur Name:_____	**Dinosaur Name:**_____	**Dinosaur Name:**_____
Picture of Fossil:	**Picture of Fossil:**	**Picture of Fossil:**
Adaptation:	**Adaptation:**	**Adaptation:**
Adaptation Use:	**Adaptation Use:**	**Adaptation Use:**

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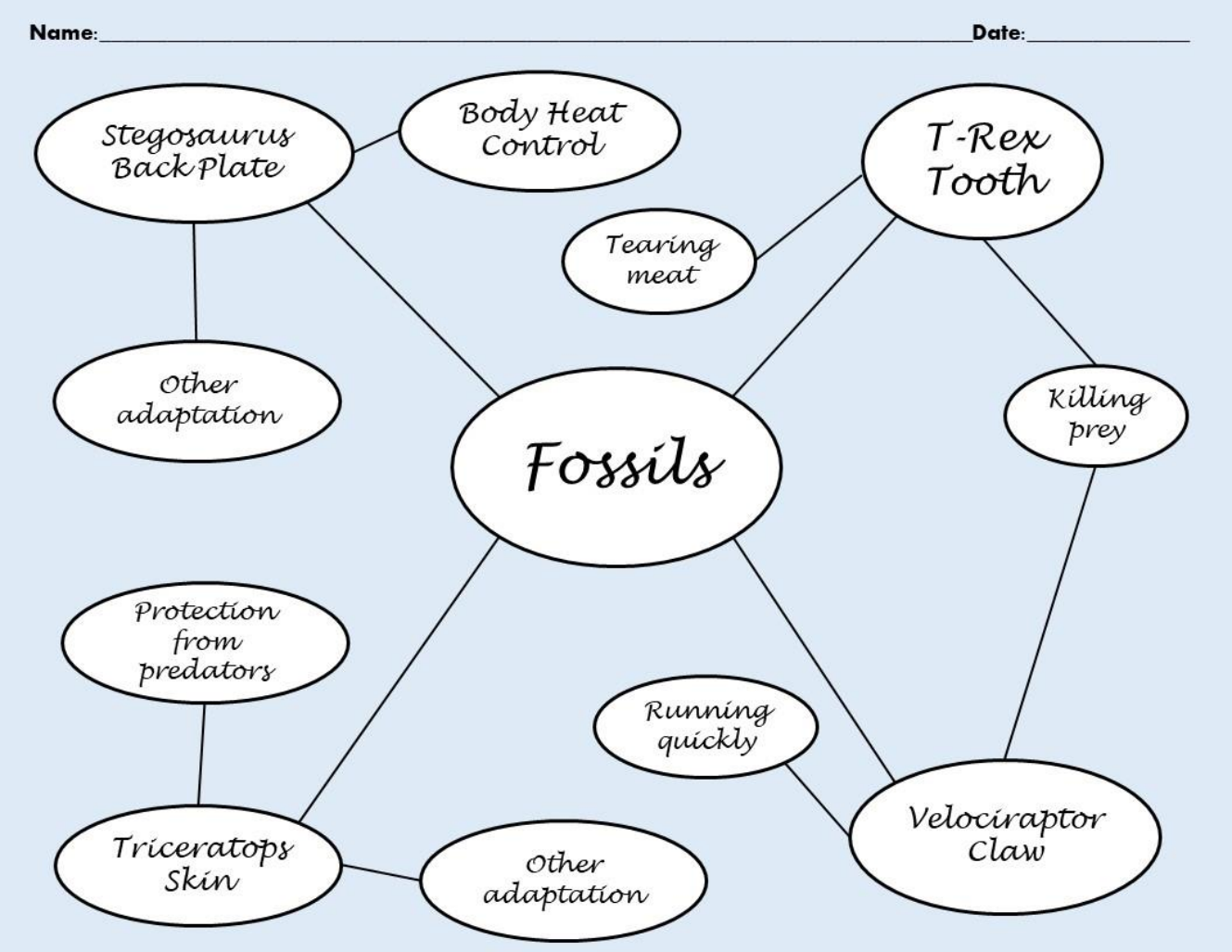
Sample Graphic Organizer from Lesson #5



Name: _____

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3. Describe how you will use formal and informal assessments in order to monitor growth and provide feedback for students toward meeting the objectives.
Formal Assessment: o I will use formal assessments to monitor growth by looking at the preassessment and the post-assessment. This will be the easiest way for me to assess a student's progress because it shows what the students knew prior to interacting with the unit, and what they learned during the entirety of the unit. In this assessment, the questions will be written to test a student's proficiency in the learning goals that were outlined at the beginning of the unit. If a student answers the questions correctly, I will know that they have met the objectives of the units and if students do not, this will be evident in the amount of questions answered correctly. I will provide students with timely feedback that is related to the objectives and which of them they need additional work on as well as which objectives they have met and/or exceeded. **Informal Assessment:** o I will use informal assessment to guide instruction and to target areas that need additional instruction. I will use whole and small group discussion to informally assess the class and their level of understanding of the content. I will also be using exit slips to assess student learning as well as reading their journal entries that they completed during the activities that were included in the lessons of the unit.
4. Describe any modifications or accommodations you have planned in the assessment tools to allow students with specific needs to demonstrate their learning.
SPED (Special Education)/Title 1 o In order to accommodate the special needs of this group of students, I will write each question in the form of multiple choice. Students will have a much easier way of answering the questions of the assessment, and with this accommodation, the rest of the class will still be able to be accurately assessed. These students will also have the opportunity to take the test with the assistance of a para as well as be provided with a term sheet with the definitions of key terms used in the unit. **ELL** o Students who are English language learners will be provided with a term sheet with the definitions listed as well. Depending on the English skills of the student, they may require the translation of each term as well as the translation of the assessment. **Gifted/Talented** o For students who are gifted and talented, there will be a section in the assessment where they are able to create their own questions to show their proficiency. This will challenge them to think backwards and require them to think of what they know already, and how they would pose that as a question as well as create answers that are not correct.
E. Classroom Management Considerations
1. Detail the management strategies and procedures that will support the implementation of this unit.

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This unit is very hands-on for students, so having a plan for classroom management is paramount. Because there is so many activities involved with this unit, I will manage behaviors and classroom transitions confusion by having the supplies laid out and separated for each group before releasing them to the activity. I will also be sure to inform students of my expectations for their behavior and what their responsibilities are prior to them completing the activity. Another important management strategy that I will implement to support this unit is to model how to interact and handle the artifacts the students will be using in the lessons. I would demonstrate this the morning of the activity, so the instruction is fresh in the students' mind when it comes time for the activity. Another reason that classroom management is important for this lesson is because the students will be participating in the field trip. Because the students will be outside of the school building and surrounded by fragile materials, students should be aware of their expectations on their behavior. I will manage this by providing an assignment where they will be required to make observations of the fossils, which will occupy them during their visit to the museum.

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DAY 1

Standards:

Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Science Standards

- *Grade 3: Biological Evolution: Unity & Diversity*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

Objectives:

- Explain how fossils are formed over the course of a million years.
- Summarize what a paleontologist does with fossils.

Vocabulary:

- **fossil-** the remains of plants and animals that lived long ago
- **fossilize-** to become a fossil or cause something to become a fossil
- **paleontologist-**a scientist who studies fossils
- **prehistoric-** relating to the period before written records; very old
- **mold-** a hollow container used to give shape to a liquid material when it hardens
- **trace fossil**- a fossil of a footprint, trail, burrow, or other trace of an animal rather than of the animal itself
- **cast**- an object made in a mold

Engage:

Before this lesson begins, students will be completing a pre-assessment, one which will be also be completed at the end of the unit to assess student progress. I will start this lesson by asking the students if any of them know what fossils are, or if they have ever seen any before. This will also be the time in the lesson where I will introduce the students' vocabulary journal. The students will write any new vocabulary words in this journal as well as the definitions, they

will also select one word to draw a picture of. After this is over, I will read approximately 10-15 pages of The Magic Treehouse book, "Dinosaurs Before Dark." When we have finished reading the first book, we will watch two videos, the first will be about paleontologists, and the second will be about how fossils are formed. After both videos have been shown to students, the class will engage in a short discussion to elaborate on any of the items discussed in the videos the students watched.

- https://www.youtube.com/watch?v=1FjyKmpmQzc (paleontologist)
- https://www.youtube.com/watch?v=bVYVnfs5NqI (fossils)

Explore:

Each student will be given three tubs of Play-Doh that are each different colors. They will also receive one plastic dinosaur along with the Play-Doh. I will begin the lesson by asking the students to take the Play-Doh out of each of the tubs and flatten it so that they have three pancake shaped discs of Play-Doh on the desk in front of them. Next, I will ask students if they remember how fossils are formed and what the most important part of a dinosaur becoming a fossil is (dying in a wet, muddy area). I will guide the discussion if the students are not responding correctly. Students will then lay one of their Play-Doh discs on their desk and place their dinosaur on top, gently pushing it into the Play-Doh. I will then explain to students that over time, mud and dirt cover the dinosaur's body and have them place the last two discs on top of the dinosaur, concealing the body. When each of the students have their Play-Doh in front of them in layers, I will ask them to recall how paleontologists find the fossils of the dinosaurs (erosion). I will instruct students to carefully remove a part of their Play-Doh little by little until they find their dinosaur in between the layers of their Play-Doh.

Explain:

Once the activity is completed and the class has cleaned up the Play-Doh, I will guide them in a discussion on how the activity they just completed was different from the actual process of fossilization. For example, I would ask students, "How is the activity not accurate to the actual process of a dinosaur becoming a fossil?", "Would the dinosaur still look the same after being buried?", or, "Why did I have you use three different colors of Play-Doh?" The students will then participate in a turn and talk with a partner and discuss the answers to the questions, as well as any observations they made during the activity. Once the students completed their discussion, the class would return to a whole group discussion on what was learned. This time would also be used to clarify any confusion among the students and identify any areas needed for additional instruction.

Elaborate:

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I would explain to students that one of the jobs of a paleontologist is to use fossils to predict the behavior of the dinosaur. One of the ways the paleontologists do this is by observing a kind of fossil called trace fossils. I would show students examples of trace fossils and explain the most common kind of trace fossil is footprints.

- The students would then partner up and be given a tub of Play-Doh and a toy dinosaur.
- One member of the partnership would be instructed to remove the Play-Doh and flatten it out.
- While the other member closes their eyes and turns around, the first person will use their dinosaur to make footprints in the Play-Doh.
- When this is done, the other partner will turn around and have to guess which way the dinosaur was walking.
- This activity would be repeated several times and I would challenge the students to make the footprints different each time, apply the dinosaur with different amounts of pressure, or only make three of the four feet make a print.

When the students have done the activity several times, I would have them discuss with their partners how they came up with their guesses about how the dinosaur was walking. I would use this activity to support student's ability to use evidence to support their reasoning. I would facilitate a whole group instruction where the class would discuss how they might use their ability to observe footprints in their lives (tracking, hunting, etc.).

Evaluate:

Because this is the introductory lesson for this unit, there will not be any formal assessment of the students. Instead, students will be evaluated through anecdotal records taken by the teacher as the students discuss what was learned during the lesson with their partners. The teacher will also take notes on student discussion and participation during the activity that helped reinforce how fossils are formed.

Name: _____

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Materials and Resources:

Websites:

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[SciShow Kids]. (2015, August 20). *Dig into paleontology*. Retrieved from https://www.youtube.com/wa tch?v=1FjyKmpmQzc

Play-Doh	3 tubs per student
Toy dinosaur	1 per students
Computer	
Projector	
Smart Board	
“Dinosaurs Before Dark”	

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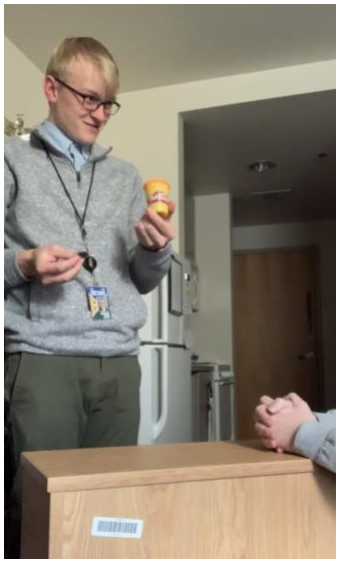
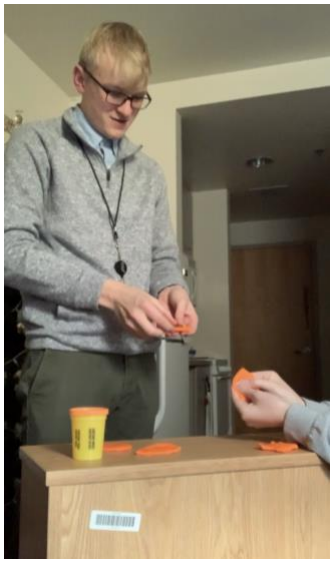
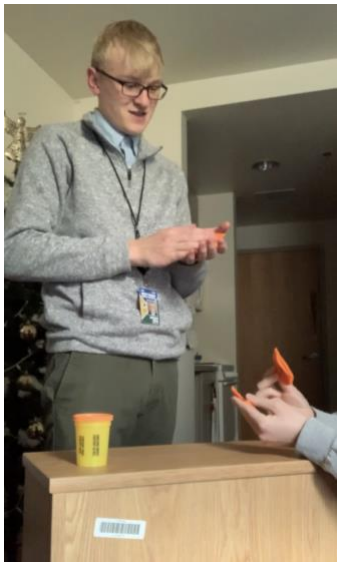
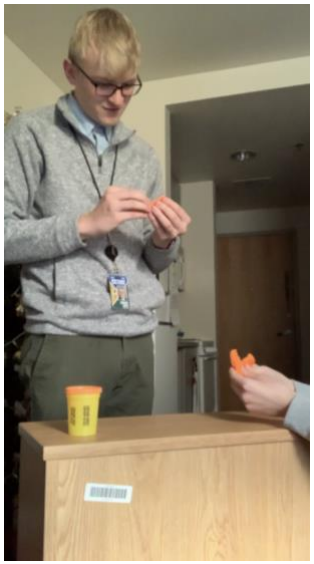

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DAY 2

Standards:

Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - 3-LS2-1: Construct an argument that some animals form groups that help members survive
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Science Standards

- *Grade 3: Ecosystems: Interactions, Energy, Dynamics*
  - 3-LS2-1: Construct an argument that some animals form groups that help members survive
- *Grade 3: Biological Evolution: Unity & Diversity*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

Objectives:

- Compare the behavior of modern-day animals to the behavior of fossilized animals.
- Predict how paleontologists can determine if a dinosaur lived in a group setting.
- Explain why certain animals live in groups.

Vocabulary:

- **fossil-** the remains of plants and animals that lived long ago
- **fossilize-** to become a fossil or cause something to become a fossil
- **paleontologist-**a scientist who studies fossils
- **prehistoric-** relating to the period before written records; very old
- **herd**- a large group of animals living together

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Engage:

The first thing the class will do for this lesson is to read another 10-15 pages of the unit's anchor text "Dinosaurs Before Dark." Students will record new vocab words in their vocabulary journal. Once I had read those pages, I will show the class a clip from *Jurassic Park* where there is a herd of Brachiosaurus shown (https://www.youtube.com/watch?v=eSS4Yt DJOO0) . In the clip, Dr. Grant says, "They're moving in herds, they do move in herds." I would explain to students that although this movie is fictional, it is based on the theory that real-life paleontologists have that Brachiosaurus did live in herds. I would ask the class, "Why do you think animals lived in herds?" Once the class had time to write down their answers in their science journals, I would move on to the activity and let them continue to contemplate the answer to this question throughout the lesson.

Explore:

Before the students get to the hands-on activity, I will show them a video that discusses animals who live in groups, meerkats in particular, and why it is they do live in such high numbers (https://www.youtube.com /watch?v=7v-D9WmEBUQ). When the video finishes, I will lead the class in a discussion where we discuss the reasons that different animals live in groups: survival and finding food and mates for reproduction. To further the understanding of this concept, the class will participate in an activity where they role play the members of an animal group.

- To start this activity, two students will role play as a lion and a zebra in the center of the room.
- I would explain to the students the rule of this game is that the lion must tag the zebra without being seen. If the lion is seen, the zebra cannot be "killed."
- The "zebra" in the scenario would stand in the center of the room and face on direction and not move their head in any other direction.
- The "lion" would be asked to walk up to the "zebra" and try to not be seen. When they got to the zebra, they will tag them, thus "killing" them.
- Once this exercise was over, I would ask the zebra if they thought it was easy to defend themselves from the lion "killing" them. I would also ask the lion if it was easy to "kill" the zebra.
- I would ask the students what the zebras could do to make them better protected from the lion attack and guide their discussion toward a group of zebras.
- Once this discussion was over, a new student would play the lion and for this scenario, there would be five zebras rather than one.
- I would instruct the zebras to stand in a circle with each of them facing outwards and send the lion in to attempt to tag one of the zebras.
- Because the zebras are facing each direction, the lion will not be able to tag any of the zebras.
- The same questions will be asked after this scenario as it was after the first scenario.

Explain:

Once the students had observed both scenarios in the previous activity, they would take out their science journals and again reflect on why animals would live in groups, and how this can help them survive. If the students had correctly said that animals live in groups to aid in their survival, then I would ask them to explain their thinking as well as how being in a group does help them survive. After a few minutes, I would lead the students in a discussion about how the animals forming groups is something called an adaptation. I would explain to students that an adaptation is something an animal can have that can aid in its survival. I would provide students with examples of adaptations that different animals have that help it survive in its environment such as giraffes having a long neck or chameleons being able to camouflage. The class would then discuss with a small group, other animals that have adaptations that help them survive in their own environments.

Elaborate:

To begin this activity, I would ask students what they remembered about the footprint activity that they completed in the previous lesson. I would ask students, "How did you know which way the dinosaur was walking?" or "How did you know how many dinosaurs had walked on the Play-Doh?" I would then show a video that describes how paleontologists can predict if dinosaurs lived in herds just by looking at the footprints the dinosaurs had left. In this activity, students will be creating their own dinosaur prints using a toy dinosaur and paint.

- I would begin by handing each students a blank piece of paper and a paper plate. Each student would also be given a toy dinosaur and have four separate colors of paint to dip their dinosaur in.
- The students would then dip their dinosaur into each color of paint and create a variety of footprints on their page of paper.
- Once they had done so, they will draw a picture of their dinosaur in front of all of the footprints they had made to create an art project.

To relate this lesson to the students' real lives, I would have them discuss which other animals live in herds in todays modern world. I would then ask students how we would know they lived in groups if we did not have pictures. I would use this time to guide students' discussion toward using footprints to know this information as well as clear up any confusion the students have.

Evaluate:

As I did in the first lesson, I will use anecdotal records to assess students as they engage in the discussion related to the activities done in class. This will help me get a gauge on what the student did not understand, and which concept they had a good grip on. I would also assess students' understanding of the content by reading through their science journals. This way I can evaluate each of my students, including the ones who did not participate in any of the class discussions.

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Materials and Resources:

Websites:

[GenerationGenius]. (2018, October 7). *Animal group behavior: Fun science lesson for kids: 3rd, 4th, and 5th grade.* Retrieved from https://www.youtube.com/watch?v=7v-D9WmEBUQ

[MrLalzor]. (2017, June 8). *Jurassic park: They move in herds 1080p*. Retrieved from https://www.youtu be.com/watch?v=eSS4YtDJOO0

"Dinosaurs Before Dark"	
Laptop	
Projector	
Smart board	
Science journal and pencil	One per student
White construction paper	One per student
Paper plate	One per student
Paint	One red, one blue, one yellow, one green
Toy dinosaur	One per student

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DAY 3

Standards:

Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Science Standards

- *Grade 3: Biological Evolution: Unity & Diversity*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
  - 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Objectives:

- Compare and contrast the adaptations between dinosaurs and modern-day animals.
- Predict how a dinosaur used an adaptation to survive.
- Explain why paleontologists use modern-day animals to study prehistoric animals.

Vocabulary:

- **fossil-** the remains of plants and animals that lived long ago
- **fossilize-** to become a fossil or cause something to become a fossil
- **paleontologist-**a scientist who studies fossils
- **prehistoric-** relating to the period before written records; very old
- **adaptation-** a special skill which helps an animal to survive and do everything it needs to do
-

Engage:

This lesson, like every other lesson, will begin by reading a portion of "Dinosaurs Before Dark." Students will also record new vocabulary in their journals. Once I had read approximately 20 pages to the class, I will show a picture of a Titanosaur to the class and explain that this is the largest dinosaur species ever

found. I will also provide students with facts such as this animal weighed seventy tons and was one hundred and twenty feet long. I will then show a video from PBS that explains the adaptations that this animal had to help it walk (https://www.pbslearningmedia.org/ resource/nat16.sci.lisci.dinowalk/studying-adaptations-for-walking-in-dinosaurs/). When the video is over, I will ask the class a few questions to get them into the mindset that they need to be for this lesson:

- What adaptations did the Titanosaur have to help it walk?
- How did the adaptations help the Titanosaur walk?
- Why did the Titanosaur need these specific adaptations to walk?
- Why did the scientists use elephants to learn more about how the Titanosaur walked?
- How are elephants different from Titanosaurs?

Explore:

In this activity, students will step into the shoes of the scientists who used elephants to learn more about the Titanosaur and how it walked. They will be completing a worksheet where they find a modern-day animal that would help them study how a dinosaur may have lived or behaved. To allow students the freedom of choice, they will have the opportunity to choose which dinosaurs they want to compare to a modern-day animal. The worksheet will have a column for the dinosaur, a column for the adaptation they want to learn more about, a column for the modern-day animal, and a column where they would write why they chose this animal to learn more about the dinosaur. To help them complete this assignment, students will use technology to research different dinosaurs as well as the adaptations that the specific dinosaur had to help it survive.

Explain:

Once students have completed the worksheet, the class will come back together for a large group discussion. At this time, students will share their ideas with the class and their classmates may offer other ways the modern-day animal can be used to learn more about the dinosaur. This time of the lesson will also be used to elaborate more on the portion of the video that showed the scientists using 3-D imagery to create an image of the dinosaur. This will help students understand how and why scientists use computers to help them put together the dinosaur. When scientists have the dinosaur put together, they might find something out that will help them understand something they previously were confused about. I would also explain to students that when scientists see the dinosaur put together, they might be able to find a modern-day animal that is similar.

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Elaborate:

To give students additional information on what else scientists do with fossils, students will be creating a "museum exhibit "of their dinosaur. The students will draw a picture of a fossil that they will create that has a specific adaptation and create a name for their dinosaur. The students will create an informational display for their dinosaur where they will detail where it lived, what it ate, and how big it was. The students will also be creating a fictional story of what modern-day animal they studied to understand how their dinosaur behaved and survived. The students should specifically find an animal that has a similar adaptation and explain why they chose to study that animal for their dinosaur,

Evaluate:

I will evaluate my students by looking at the worksheets they completed during the activity. The entirety of the worksheet should give me a good idea of the students meeting the objectives of this lesson, however, the reasoning column will be the most important. This will help me see how the student is understanding how scientists use modern-day animals as a way of studying dinosaurs. I will also the whole group discussion after the activity to assess the student's ability to think of additional ways of using modern-day animals to study dinosaurs and their adaptations.

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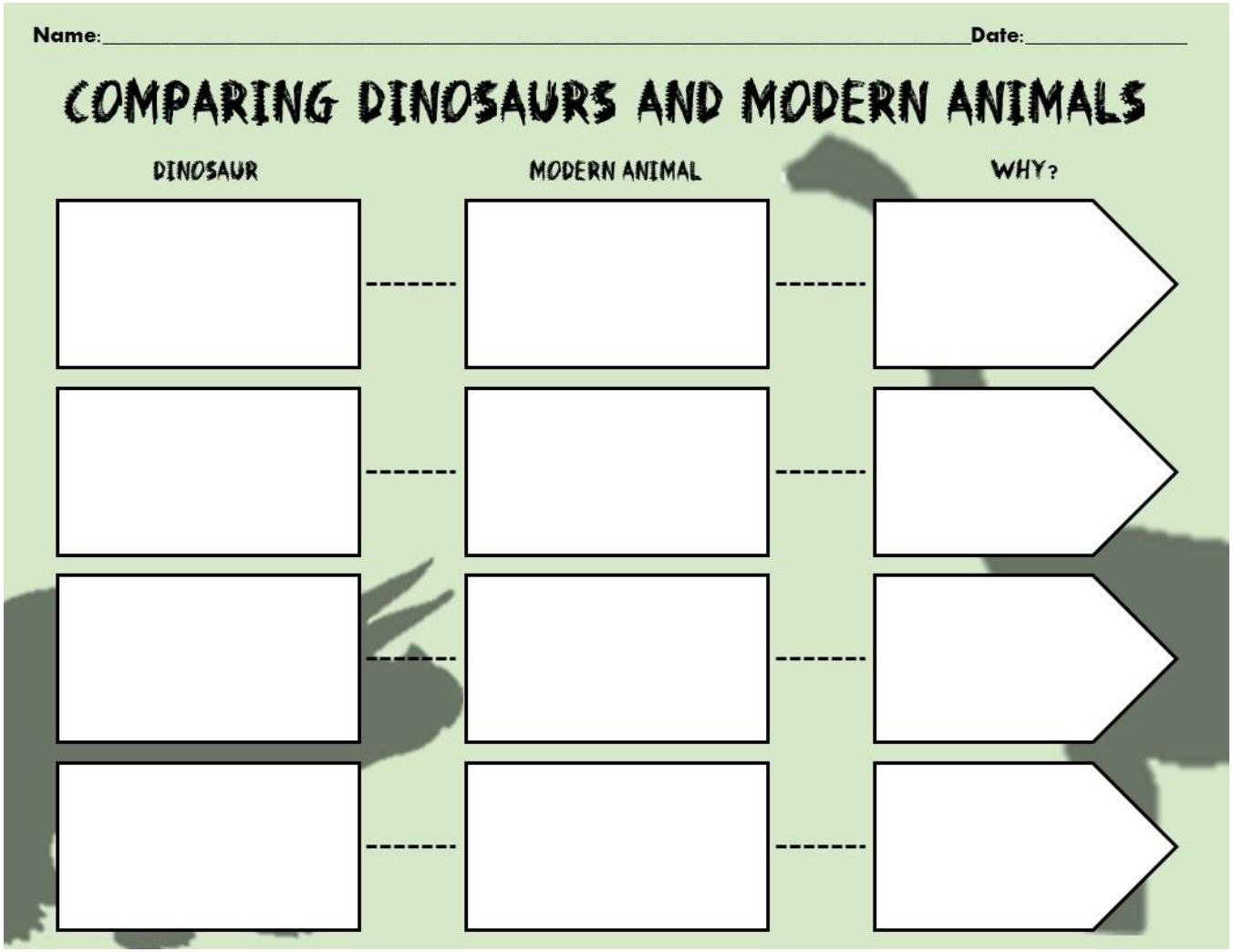

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Materials and Resources:

Websites:

PBSLearningMedia. (2019). *Studying adaptations for walking in dinosaurs*. Retrieved from https://www.pbslearningmedia.org/resource/nat16.sci.lisci.dinowalk/studying-adaptations-for-walking-in-dinosaurs/#.XdSkl1dKjtQ

"Dinosaurs Before Dark"	
Computer	
Projector	
Smart Board	
Pencil	1 per student
Dinosaur Adaptation Worksheet	1 per student
Laptop	1 per student
Construction paper	2 pages per student

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DAY 4

Standards:

Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Science Standards

- *Grade 3: Biological Evolution: Unity & Diversity*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago
  - 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Objectives:

- Locate and point out different adaptations on the fossils of dinosaurs.
- Practice identifying adaptations by looking only at the bones of the dinosaur.
- Construct a personalized tour of the museum using web resources.

Vocabulary:

- **fossil-** the remains of plants and animals that lived long ago
- **fossilize-** to become a fossil or cause something to become a fossil
- **paleontologist-**a scientist who studies fossils
- **prehistoric-** relating to the period before written records; very old
- **adaptation-** a special skill which helps an animal to survive and do everything it needs to do
- **museum-** a building in which objects of historical, scientific, artistic, or cultural interest are stored and exhibited
- **exhibit-** publicly display (a work of art or item of interest) in an art gallery or museum or at a trade fair

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Engage:

Prior to this lesson taking place, students will be recording new vocabulary words into their journals. This lesson will take place at the Science Museum of Minnesota, so we would not read any of "Dinosaurs Before Dark." To garner student interest in this lesson, I would give the students a tour of the museum's website (https://www.smm.org/exhibits-films). At this part of the lesson, I would tell students that they will be visiting the museum and that they will have the opportunity to create their own tour of the museum where they get to choose which exhibits they would want to visit. I would also inform students that they will be completing a scavenger hunt in the dinosaur and fossil exhibit where they will be searching for adaptations in each of the dinosaurs at the museum.

Explore:

Before the students visit the museum, they will be creating a tour that is personalized to their liking. The students will be required to include each of the nine exhibits that are in the museum. The tour will also include time spent at each as well as what will be the centerpiece of each exhibit in their tour. In the tour that the students create, they will choose one exhibit and write a small paragraph that details what is in the exhibit and some important facts about the items in the exhibit. The students will be using their own laptops to research and to help in creating each proponent of the tour. Once each student has completed their tour, they will pair with another student and give them a brief explanation of their customized tour.

Explain:

During this part of the lesson, students will have the opportunity to share their tours with the class. Each student will present their tour to the rest of the class. As they do so, the students will also be making a tally of which exhibit they chose as their main exhibit. After each student has presented and tallied, the class will create a graph. This will also be a time in the lesson where students are reminded how to be respectful and they will also be reminded of their behavior expectations at the museum.

Elaborate:

The next activity students will be completing will be done at the museum and will help them practice their ability to identify adaptations in dinosaur fossils. This skill will be needed in the next lesson and having the opportunity to practice this skill by interacting and viewing the fossils in front of them. The students will be given a scavenger hunt that includes three spaces for students to choose three dinosaurs that they see at the museum. They will write the name of the dinosaur that they see, draw a picture of the fossil, and then circle the adaptation they pick out. Below the picture, students will identify the adaptation and the way the dinosaur used the adaptation to it's advantage.

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Evaluate:

I will use the scavenger hunt activity to assess student's proficiency in meeting the objectives. The first activity that students are completing is to help them understand what they are going to see and also to build their excitement about going to the museum. I will use anecdotal records during the discussion on what kind of questions should be on the scavenger hunt. This will tell me a lot about how passionate the students are about their learning. It will also help me assess their understanding of what an adaptation is and the different adaptations dinosaurs can have.

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Name:_____ Date:_____

DINOSAUR ADAPTATION SCAVENGER HUNT

Dinosaur Name:_____	Dinosaur Name:_____	Dinosaur Name:_____
Picture of Fossil:	Picture of Fossil:	Picture of Fossil:
Adaptation:	**Adaptation:**	**Adaptation:**
Adaptation Use:	**Adaptation Use:**	**Adaptation Use:**

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Materials and Resources:

Websites:

Science Museum of Minnesota. (2019). *Exhibits, films, and events*. Retrieved from https://www.smm.org/e xhibits-films

Computer	
Projector	
Smart Board	
Laptops	1 per student
Field Trip permission form	1 per student
Scavenger Hunt worksheet	1 per student

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DAY 5

Standards:

Next Generation Science Standards

- *Grade 3: Interdependent Relationships in Ecosystems*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago

North Dakota State Science Standards

- *Grade 3: Biological Evolution: Unity & Diversity*
  - 3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago
  - 3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Objectives:

- Examine a set of fossils and observe adaptations within each fossil set.
- Determine the use of the adaptations observed in the fossil, and how it aided in the survival of the animal.
- Create a table to categorize each adaptation and its use in survival.

Vocabulary:

- **fossil-** the remains of plants and animals that lived long ago
- **fossilize-** to become a fossil or cause something to become a fossil
- **paleontologist-**a scientist who studies fossils
- **prehistoric-** relating to the period before written records; very old
- **adaptation-** a special skill which helps an animal to survive and do everything it needs to do
- **diet-** the kinds of food that a person, animal, or community habitually eats
- **habitat-** the natural home or environment of an animal, plant, or other organism.

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Engage:

The lesson would begin by finishing the book "Dinosaurs Before Dark" before hooking the students' interest in the content. I will also have students write their new vocabulary words into their journals. To spark student interest for the lesson, I will present a fossil such as a tooth of a T-Rex and ask the students how this would have helped the T-Rex survive in prehistoric times. After having a brief discussion about how the sharp teeth would help the T-Rex tear through the meat of the animals that they were eating, I would pass the tooth around the room and have students interact with the fossil firsthand. When the students have each had an opportunity to see the tooth up close, I will model how to create a graphic organizer. Using the document camera, I will guide students through the process of creating an organizer that allows the students to categorize each adaptation with its use in the aid of survival.

Explore:

This activity is reliant on the students being respectful and being careful with the artifacts they will be handling. Because of this, I will spend a large portion of time before the activity explaining to students how they must be careful with the fossils during the activity. Before the students begin the activity, the classroom must be set up into stations where the class will be interacting with a variety of fossils. The best way to do this is to have students help push their desks into small groups with space around each grouping so they have space to move around. At the center of each desk "island" will be a fossil that the students will be observing. To start the activity, students will be numbered off and be assigned a station to begin at and at every 10 minutes, the students will rotate to a different station to observe another kind of fossil. Students will be bringing their graphic organizer/science notebook to each station to make observations and inferences about each of the fossils they interact with. Students will be visiting four stations and include the T-Rex tooth in their graphic organizer for a total of five fossils that they will be observing. The five fossils the students will be observing are the following: Stegosaurus back plate, Triceratops skin, Velociraptor claw, and Ankylosaurus armor. At each station, there will be a picture of the dinosaur the fossil belongs to so students can visualize how the dinosaur looked.

Explain:

After each group of students had visited each of the stations, they will move their desks back to their original places and meet with a small group of students from different rotating groups. In each of the small groups, each student will share their inference about one of the fossils. Each student in the small group will share their ideas on a different fossil so they can hear an idea they might not have had on each of the fossils. When each of the groups finish their discussions, we will meet as a whole class and share the observations the students had made during the activity. In order to further student understanding of the concept of adaptations helping different animals survive, I would relate the characteristics of the fossils to an example the students may understand. For example, I would relate the armor from an Ankylosaurus to the armor a knight wears. I would ask the students why a knight wears armor and how this

adaptation might have helped the Ankylosaurus survive. The discussion would then turn to other examples the students could think of to relate the adaptations they observed to examples they know.

Elaborate:

Students will read through the book "World Encyclopedia of Fossils and Fossil Collecting" and select one that interests them the most. The students will then create an informational book on the fossil they selected and present it to the class. In the book, the students will include the following items:

- Where the fossil was found
- What type of fossil it is
- Ideas about the animal's habitat, diet, appearance, and any other observations the student made
- A timeline of their animal's life
- A picture of the animal in their habitat

Evaluate:

The best way to evaluate students on their understanding of adaptations and how they aid in an organism's survival is to assess each student's graphic organizer, particularly the section on how the adaptation helped them survive. I will also assess the students' understanding by listening in on their discussion of how they are relating the adaptation to an example they are familiar with, such as the knight example. Another way of assessing the students is to read through their books they are creating and see what ideas they came up with about the animal's habitat, diet, and appearance. The students will also be completing the assessment they were given at the beginning of the unit to assess their progress and proficiency of the learning goals.

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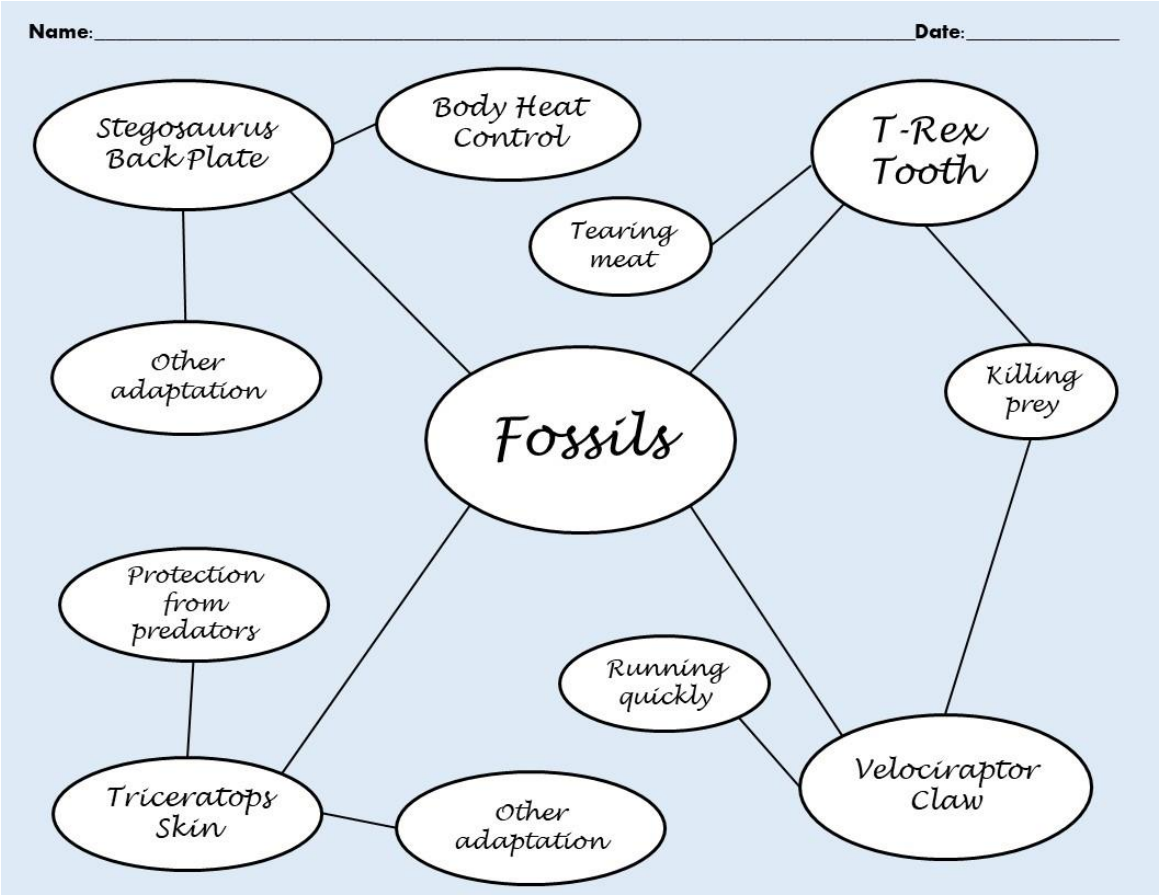

Name: _____

WHAT CAN FOSSILS TELL US ABOUT THE PAST ?

1. **What is a fossil?**
   a. the remains of animals that lived long ago
   b. a kind of dinosaur
   c. a tool used to dig

2. **A paleontologist is someone who...?**
   a. finds the cure to illnesses
   b. is a doctor for children
   c. studies fossils

3. **Why do paleontologists study fossils?**
   a. to learn about how the dinosaur lived
   b. to have something to do with their time
   c. to put the skeleton together

4. **Which of the following is an example of an adaptation?**
   a. a mouse having a small tail to fit in small places
   b. a giraffe having a long neck to eat the leaves at the top of trees
   c. a group of caribou living together to look out for predators

5. **Why do some animals live in large groups?**
   a. to protect themselves from predators
   b. to have a larger selection of mates
   c. both a & b

6. **What is the definition of an adaptation?**
   a. a skill that helps an animal survive
   b. the act of adding onto a house
   c. a trip that involves a family moving across the country

7. **How much do you know about fossils?**

Nothing at all A little I'm an expert!

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Materials and Resources:

"Dinosaurs Before Dark"	
Document camera	
Smart board	
T-Rex tooth	
Stegosaurus back plate	
Triceratops skin	
Velociraptor claw	
Ankylosaurus armor	
Science notebook/pencil	1 per student
"World Encyclopedia of Fossils and Fossil Collecting"	
Construction paper	1 per student